AELIUS GALLUS AND THE REORGANIZATION OF THE IRRIGATION SYSTEM OF EGYPT UNDER AUGUSTUS

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The physical character of the Mediterranean world, its great shore line and its peninsulas, its relatively narrow width in relation to its great length—these are the fundamental factors which made possible the development of the urban character of Greco-Roman civilization. The peninsulas jutting southward make the connections easy, north to south as well as east to west. The early direct connections of Egypt and Crete evidenced in the reliefs from the tomb of Sen-mut at Thebes[1] are proof enough of this. For this space between Egypt and Crete is the longest open-sea sail which is necessary in the Mediterranean, even presupposing that it was made westward along the shore of Africa to some harbor on the Libyan littoral and thence directly northward. Even so, it is longer than the sail from Carthage to Sicily or that from the Phoenician colonies in Northern Africa directly northward to Spain.

Despite this fact—that easy sea transport and cheap freightage gave the impetus to, and furnished the background for, the city life of the ancient Mediterranean—it is evident that the question of the food supply for the larger cities was always a difficult one for the ancients to solve.[2] Individual business initiative, probably because of the want of sufficient capital in single hands and the lack of a developed credit system,[3] could not meet the requirements of the situation. In the early Mediterranean absolutistic states the rulers, that is, the state, were the great handlers and exporters of grain. In this rôle the Hellenistic kings followed their oriental predecessors; and they used the power of their grain control to further their political aims. The distance and insecurity of the grain import from lower

[1] W. Max Müller, *Egyptological Researches*, Carnegie Institution (Washington, 1906), I, 12 ff.

[2] M. Rostowzew, in Pauly-Wissowa, *Real-Encyklopädie*, VII, 139–40, *frumentum*.

[3] Westermann, "The Economic Basis of the Decline of Ancient Culture," *Am. Hist. Review*, XX, 743.

Russia, the privateering of the Greek mercenary captains in the fourth century B.C., the arbitrary and prohibitive tolls imposed by cities in favorable positions like Byzantium, the unrestricted piracy of the first half of the first century B.C.—all of these were additional elements which militated against the natural advantages for urban life supported by cheap and effective water transportation which the Mediterranean world possessed.[1] Freightage of grain by land was exceedingly slow and difficult as compared with modern rail transportation, and therefore costly. Here the advantage of the modern urban life over the ancient is obvious.

Throughout the history of the Roman Republic we catch echoes of the difficulty of supplying the citizen consumer at Rome with a sufficient supply of grain at a reasonable price. In the last century of the Republic the trouble apparently became more urgent. In 57 B.C. Gnaeus Pompey was placed in charge of the *cura annonae*, in the special sense of the food supply of Rome, for a five-year term. In 44 B.C. Julius Caesar instituted the two *aediles ceriales* to take care of this task.[2] It is evident from Augustus' own account in the *Res gestae* that he regarded seriously the obligation of the ruler in respect to the city's grain supply. In 23 B.C. he made twelve distributions of grain for which he supplied the funds out of his private means.[3] In 22 B.C., when there was a notable scarcity of grain at Rome, he took over the *curatio annonae*, which he so handled that in a few days the people was freed from fear and danger.[4] After 18 B.C., whenever the state revenues failed to come in, he made large and apparently frequent contributions in grain and in money out of his own property.[5] It is clear that Augustus regarded his activities in relation to the city food supply as a not unimportant part of his executive career and as worthy of mention in this important document which he was leaving to be read before the Senate and published before his tomb for the Roman people to see.

[1] See Rostowzew, *op. cit.*

[2] A sketch of the *cura annonae* under the Republic, by Rostowzew, will be found in Pauly-Wissowa, *Real-Encyklopädie*, I, 2317–18. The facts are well known.

[3] *Monumentum Ancyranum*, chap. 15: "consul undecimum duodecim frumentationes frumento privatim coempto emensus sum."

[4] *Ibid.*, chap. 5.

[5] *Ibid.*, chap. 18. In the shattered condition of the Latin text in this place the Greek version is the safer guide to the meaning of Augustus.

Even Dio connected the peculiar care which Augustus displayed in his treatment of Egypt with its revenues and its importance for the grain export.[1] In fact, Augustus set Egypt aside as a land especially devoted to the *annona civica* of Rome; and this obligation rested upon the Nile fields as a new and heavy burden during the Empire.[2] In view of this situation the report of Suetonius[3] in regard to Augustus' activity in cleaning out the irrigation ditches of Egypt assumes a significance already thoroughly recognized by Wilcken.[4] Suetonius says:

> After Egypt had been brought under provincial organization, in order that he might make it more available for the city's [i.e., Rome's] grain supply,[5] with the aid of the soldiery he cleaned out all the canals into which the Nile empties, which in the course of years had become silted up.

The use of the soldiery on this fatigue duty is sufficient proof of the large and organized scale upon which the work was conducted. The necessity of this large enterprise presupposes gross neglect of the irrigation system under the lax administration of the later Ptolemies.[6]

A statement of Strabo[7] gives us positive evidence of the successful results of the cleaning out of the irrigation system undertaken under Augustus' orders. Strabo says that before Gaius Petronius became Roman prefect of Egypt the greatest productivity occurred when the Nile rose fourteen cubits, but when the river rose only eight cubits famine resulted. During the prefecture of Petronius when the Nilometer measured a rise of twelve cubits, the grain production of Egypt was at its maximum; and when the Nilometer measured but eight cubits, no complaint of famine was heard. Strabo's statement rests upon facts, and his readings were taken from the Nilometer at Memphis.[8] This reduction of the maximum overflow necessary to obtain "bumper crops" from fourteen to twelve cubits represents a deepening of the canal beds throughout and especially at the mouth, or Nile entrance, of each canal. The shoveling by hand necessary to

[1] Dio Cassius 51. 17: *τήν τε σιτοπομπίαν καὶ τὰ χρήματα.*

[2] U. Wilcken, *Papyruskunde, Grundzüge*, I, No. 1, 186–87, 368–69.

[3] Suetonius *Augustus*, chap. 18. [4] Wilcken, *op. cit.*, I, 186.

[5] Suetonius, *op. cit.*: *ut feraciorem habilioremque annonae urbicae redderet.*

[6] Wilcken, *op. cit.* [7] Strabo xvii. 1. 3.

[8] L. Borchardt, "Nilmesser und Nilstands-marken," *Abhandlungen der Preussischen Akademie*, 1906, p. 50.

accomplish this could be carried on only at such a time as would least discommode the peasants in the agricultural work of the year. This would be from the period of the harvest up to the high flood of the following agricultural year, that is, roughly calculated, from the end of April to September.[1] It would seem, therefore, to have been a task of more than one year's duration.

The reorganization of the canal system under Augustus was assigned by Dio to Augustus himself during his stay in Egypt in 30 B.C.[2] The statement of Strabo, however, shows that Dio has here no chronological value. For, if the work had been done in 30 B.C., the change in the required rise of the Nile necessary to produce good crops would have appeared in the prefecture of Cornelius Gallus in 29 B.C. The project is usually placed by modern historians in the prefecture of Gaius Petronius.[3] This is done because of Strabo's statement that the rise of eight to fourteen cubits produced satisfactory to excellent crops in the time of Petronius' prefecture (ἐπ' ἐκείνου δὲ ἄρξαντος τῆς χώρας). Strabo, however, nowhere ascribes the actual work to Petronius. For reasons which follow I am convinced that the actual supervision and responsibility of the cleaning of the canals fell, for the greater part, upon Aelius Gallus when he was prefect of Egypt.

When dealing with the alluvial plain of the Tigris-Euphrates basin about Babylon, Strabo shows an unusually clear knowledge of the whole process of river irrigation.[4] He has a perfectly clear conception of the paramount difficulty which arises in maintaining such a system in a low alluvial plain—namely, silting. He first makes a brief statement about the Tigris-Euphrates basin, to the effect that Alexander destroyed the barrages erected by the Persians in the Tigris and Euphrates rivers:

He also gave his attention to the canals. For the Euphrates overflows at the beginning of the summer, commencing to rise from the springtime

[1] The danger to the dykes from the high Nile begins in Thoth (September) (*P. Lond.*, I, 166 f.). Thereafter the year to Pachon (May) is filled with repairing dykes, irrigating, weeding, etc. The dyke-tax receipts of the papyri show that this government work was carried on from Pachon into Thoth—May into September.

[2] Dio Cassius 51. 18. 1.

[3] It is so placed by L. Cantarelli, *La Serie dei Prefetti di Egitto* (Rome: Reale Accedemia dei Lincei, 1906), pp. 17–18, and by Borchardt, *op. cit.*, p. 50.

[4] Strabo xvi. 1. 9, 10.

when the snows of Armenia melt. Necessarily, therefore, the arable land would become swampy and be submerged if someone did not divert the overflow of the stream and the excess of water by making ditches and by canals, just as is done with the water of the Nile in Egypt.[1]

This statement is followed by a fairly scientific disquisition upon the silting up of canals.[2] It is general in tone, but more applicable in its particulars to the Nile Valley than to the Tigris-Euphrates basin.[3] Moreover, the likening of the situation in the Babylonian region to that of the Nile focuses the reader's attention thereafter rather upon Egypt than upon Babylonia.

Strabo realizes and expresses clearly the difficulties. The first is the continual process of silting up of the ditches. As a result of this, the lowlands of the delta, *τὰ πρὸς τῇ θαλάττῃ πεδία*, become swampy and overgrown with reeds. "It is not perhaps possible to prevent such flooding altogether; but it is the part of good governors (*ἡγεμόνων*) to render as much aid as they can." Strabo goes on to state that the methods of preventing inundation are two: first, to check superfluous overflow by diking the river in (*ἐμφράξει*); secondly, to prevent the filling up of the canals which the current causes, by cleaning them out and opening up their mouths. Where did Strabo get his accurate understanding of the methods of river irrigation and its difficulties? Since no knowledge has come down to us of any ancient scientific treatise upon the subject, the answer must be found in his trip through Egypt with Aelius Gallus, one of the prefects during the first decade of Egypt's existence as a Roman province. Aelius Gallus was Strabo's friend and companion. Strabo was with him when he was prefect of Egypt and traveled southward with him as far as Syene and the boundaries of Ethiopia.[4] He also records that he visited the vicinity of Thebes and listened to the "vocal Memnon" when traveling in the train of Gallus.[5] The natural presumption is that personal observation in Egypt when traveling with his friend

[1] *Ibid.*, § 9. [2] *Ibid.*, §§ 9, 10.

[3] In fact, Herodotus, i. 193 tells us that the Tigris and Euphrates do not of their own accord overflow the grain lands. On the contrary, the water must be lifted either by hand or by machines.

[4] Strabo ii. 5. 12: *ἀνὴρ φίλος ἡμῖν καὶ ἑταῖρος Αἴλιος Γάλλος.*

[5] Strabo xvii. 1. 46: *κἀγὼ δὲ παρὼν ἐπὶ τῶν τόπων μετὰ Γάλλου Αἰλίου καὶ τοῦ πλήθους τῶν συνόντων αὐτῷ φίλων τε καὶ στρατιωτῶν περὶ ὥραν πρώτην ἤκουσα τοῦ ψόφου.*

Aelius Gallus gave him his intimate acquaintance with the work which a good ruler must do in cleaning out a canal system. This presumption is strengthened by two indications in his general treatise on irrigation quoted above. He speaks of "the river" (ποταμόν, xvi. 1. 10), not "the rivers," as would be the case were he dealing with the Babylonian district. Furthermore, ἡγεμών is the term regularly used by the Egyptian subjects in speaking of their prefect of Egypt and points strongly to an Egyptian source.

Strabo's knowledge of the activities required of a good governor in connection with an irrigation system (he has in mind the Nile system) and his presence in Egypt with Aelius Gallus seem to me to stand in a clear relationship. The credit for the actual guidance of the work of reorganizing the system I am constrained to ascribe, for the greater part, to the prefect Aelius Gallus.

The results of this reorganization appeared in the prefecture of Gaius Petronius, as is clear from Strabo's statement. The order of the prefects would therefore be Aelius Gallus followed by Gaius Petronius. Our results bring an independent confirmation of Mommsen's decision,[1] made on the basis of other evidence, that Aelius Gallus preceded Petronius, as against the older chronology (based upon Josephus, *Ant. Jud.*, XV, 307), which placed Petronius before Gallus. The chronology now generally accepted for the first three prefectures is as follows: Cornelius Gallus, 29–27 B.C.; Aelius Gallus, 27–24 B.C.; Gaius Petronius, 24–? B.C.[2] The unsuccessful Arabian expedition of Aelius Gallus occupied both him and the soldiers of Egypt for about ten to twelve months in 25–24 B.C.[3] The bulk of the work of canal reorganization, since Suetonius expressly states that it was done with the aid of the soldiers, must be placed in the years 27–26 B.C., with the possibility of adding 28 B.C. under Cornelius Gallus for the beginning of it, and the year 25 B.C. for its completion, probably with Egyptian corvee labor. In the last half of 24 B.C., when Petronius became prefect, the surplus crop of the Egyptian agricultural year of Choiak to Payni (November–May)

[1] Mommsen, *Res gestae divi Augusti*, 2d ed., pp. 106–7. For the literature upon this question see Gardthausen, *Augustus und seine Zeit* (Leipzig, 1891), II, 447 ff.

[2] Mommsen, *op. cit.*, p. 106; L. Cantarelli, *op. cit.*, pp. 15–18. The end of the prefecture of Petronius is uncertain.

[3] See Gardthausen, *op. cit.*, and Johannes Schmidt, *Philologus*, XLIV, 465.

of the year 25–24 was at his disposal for the sale of grain made to his friend Herod in the second year of the famine in Palestine.[1] The need of the east seems to have swallowed up the surplus left in this year after the requirements of the native population of Egypt and the Roman legions in service there had been supplied. Therefore in 23 B.C. Augustus was compelled to *buy* grain for the twelve largesses made in that year.[2] In 22 B.C., when the food situation at Rome was such that it could be called a "danger" and regarded with "fear," Augustus accepted the *curatio annonae* and relieved the situation "at his own expense" (*ταῖς ἐμαῖς δαπάναις*) within a few days.[3] The expenditure of 23 B.C. is listed in the account of money expenditures in chapter 15 of the *Res gestae*. This one of the year 22 is not so listed, though it was "at my expense." Available for Augustus in the granaries of Ostia would be the surplus of the Egyptian rentals in grain of the harvest of 24–23 B.C., which would be collected in Egypt during the summer and fall months of 23 B.C., when the flood was on, the canals full, and the transport from the villages to the Nile granaries possible. The grain would be in Alexandria some time in the fall and thence shipped to Rome late in the year 23 B.C. Again it must be the rentals in kind from his Egyptian properties which were the source of his contributions of grain in the grain and money *συντάξεις*, made sometimes to 100,000 people, sometimes to more, and occurring at intervals after 18 B.C.[4] So the cleaning of the ditches in Egypt meant to Augustus the possibility of steadying the city grain supply at any time. It is small wonder that he considered it expedient to make travel in Egypt for his family and for senators especially difficult and that he gave the land a peculiar place in his organization.

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[1] Josephus, *Ant. Jud.*, XV, 307.

[2] *Mon. Ancy.*, chap. 15.

[3] *Ibid.*, chap. 5.

[4] *Ibid.*, chap. 18, *ὅτε ὑπέλειπον αἱ δη[μό]σιαι πρόσοδοι, ἄλλοτε μὲν δέκα μυριάσιν, ἄλ[λοτε] δὲ πλείοσιν σειτικὰς καὶ ἀργυρικὰς συντάξεις ἐκ τῆς ἐμῆς ὑπάρξεως ἔδωκα.* Mommsen's assumption that these grain and money contributions were paid to 100,000 or more individuals in the provinces (*Res gestae*[2], p. 77) at various times, to cover their inability to meet the tribute payments, is absolutely inadmissible. On the same page Mommsen suggests the correct explanation—namely, that these contributions must be connected with the *cura annonae* of 22 B.C.